

Clinical Section

*The Diagnosis and Treatment of Intracranial Birth Injury of the Foetus

by

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As a Paediatrician I feel very much honored to be asked to contribute what little I know on the subject of the diagnosis and treatment of intracranial birth injury of the foetus.

TALBE 1 (HOLT AND BABBITT)¹—CAUSES OF DEATH DURING FIRST FOURTEEN DAYS

Cause of Death	Under 1 Day		Under 7 Days		7 to 14 Days		Total in 14 Days		Grand Total
	Premature	Full Term	Premature	Full Term	Premature	Full Term	Premature	Full Term	
Congenital weakness.....	93	2	120	7	14	2	134	9	143
Accidents of labor	1	14	1	32	..	..	1	32	33
Pneumonia.....	..	..	3	9	3	13	6	22	28
Atelectasis.....	3	7	3	14	1	7	4	21	25
Congenital syphilis	5	0	6	1	6	0	12	1	13
Malformation.....	..	4	2	7	0	3	2	10	12
Hemorrhage.....	..	..	..	8	..	2	..	10	10
Sepsis.....	..	..	..	2	..	7	..	9	9
Asphyxia.....	..	7	..	8	..	..	..	8	8
Accidental.....	..	1	..	2	..	..	..	2	2
Undetermined.....	..	3	..	8	..	..	..	8	8
Total.....	102	38	135	98	24	34	159	132	291

The table illustrates that with the advances in diagnoses in the new-born, many causes of death that were formerly ascribed to birth injury and laid to faulty obstetrics, can now be explained on other bases. It is also recognized that cerebral hemorrhage may occur with Caesarean Section and commonly in prematures, the cause being attributed to intra uterine trauma, and in the rare case to the hemorrhagic diathesis.

The table also illustrates that before one arrives at the diagnosis of birth hemorrhage as the cause of death, one must do so only by a process of exclusion. In the table, accidents of labor, which consist largely of instances of intracranial hemorrhage, represent the cause of death of 33 or about 11% of the infants who died shortly after birth. It should be said that with reference to this group, that the infants were born in the Sloane Hospital for Women and that in each instance labor was attended by a well-trained obstetrician.

Perhaps this has some significance. Grulee² has analyzed the statistics of Gillespie, Adair, also Clein, who found in a group of premature infants that cause of death of 50% of those who died was cerebral hemorrhage, also Irving of the Boston

Lying-in Hospital, and Fleming, Royal Maternity Hospital in Glasgow. Grulee concludes that between 25 and 40% of the deaths of the new-born may be attributed to intracranial hemorrhage, and that the number of instances of intracranial hemorrhage in maternity hospitals varies with the hospital, but the condition is probably as frequent as 1 to 25 or as low as 1 to 150 deliveries. It therefore seems not unlikely that the method of delivery and the attitude of the accoucher have a definite influence on the rate of mortality from intracranial hemorrhage.

Some obstetricians think that to achieve a live birth is all that is required, but the obstetrician must learn that before he can congratulate himself on having a living mother and a living child after a difficult delivery, he must remember that as a result of this difficult delivery, the living child may develop into a very defective child. The attending obstetrician must thoroughly appreciate his responsibility for the early recognition of these injuries in the new-born, especially since therapeutic measures, to be effective in these cases, must be employed early.

Dr. McGuinness has discussed the types of difficult labor that are most likely to produce cerebral damage and therefore in the attempt to make a diagnosis of intracranial injuries of the new-born, accurate details of the labor must be ascertained, to be followed by an examination for any external evidence of excessive pressure, such as extensive caput formation, excessive moulding or forceps marks, especially in cases in which the forceps have been applied in the wrong diameter.

There is not the slightest doubt that many infants who survive have intracranial injuries. The greater number of them will have no more than small hemorrhages and small tears of the "Tentorium Cerebelli," or more commonly oedema of adjacent parts. But others may survive who have extensive intracranial injuries. But as a general rule if the hemorrhage is extensive, the child is still born. In those who survive, the clinical signs and symptoms are neither uniform nor characteristic. They are usually present at or soon after delivery; but occasionally the symptoms do not appear for three or four days, because bleeding continues slowly for the first few days and the accumulation of the blood eventually becomes great enough to produce signs or symptoms.

The infant is usually born in a condition of asphyxia, generally of the pallid type, and is often difficult to resuscitate. If respiration is established, it may be noticed in the next few days that the respirations are slow and irregular, more rarely they are rapid and shallow, and there are often attacks of cyanosis. Often the child is noticed to have focal or general convulsions, neck rigidity, perhaps unequal pupils, and strabismus or nystagmus; it may be either extremely

* Paper read at Post-Graduate Course, Manitoba Medical College, February, 1937.

lethargic or very restless and emit a continuous whining cry. A most important point is that the sucking reflex is often impaired or absent.

The condition of the anterior fontanelle is very often misleading. It must be strongly emphasized that we cannot rely on the bulging of the fontanelle for diagnosis. Although in the greater number of cases of hemorrhage the fontanelle is tense and bulging, occasionally it may even be depressed; yet autopsy may, when the fontanelle is depressed, reveal definite hemorrhage, usually of the infratentorial type. Actually in such cases we usually find that the fontanelle has a more or less characteristic board-like feel. Attempts have been made to distinguish supratentorial bleeding from that of infratentorial origin by symptomatology; for the seat of the hemorrhage is important, since a small blood effusion beneath the tentorium is of graver consequence, owing to close proximity to the vital medullary centres, than one on its surface, however large it may be. A supratentorial hemorrhage characteristically occurs in the restless irritable type of infant with bulging fontanelle, and with cyanosis that appears late and that is not especially pronounced since the respiratory centre is not affected until towards the end. In the infratentorial type, however, the infant is quiet, apathetic and early shows signs of cyanosis owing to close proximity to the medulla; and neck rigidity is soon present as the result of the irritating presence of blood in the upper part of the spinal canal.

Lumbar Puncture.

To confirm our suspicions, lumbar puncture is indicated.

If one consults the average text book, one is impressed by the fact that the diagnosis of intracranial hemorrhage is easy and is based usually on two things—blood in the spinal fluid, and convulsions.

Even with every precaution of which the most essential is a very fine lumbar puncture needle, there are many pitfalls. The venous plexus in the walls of the spinal canal in the new-born is extremely rich and the vertebral bodies are almost cavernous with venous sinuses. Puncture of a blood vessel or sliding the needle into the vertebral body is comparatively easy and results in bloody fluid, or because of the loose attachment of the dura to the vertebral column at this age, if the needle is not sharp, one can push the membrane ahead of it and produce a pocket which soon fills with blood. With cisternal puncture, there are not these difficulties other than the technical difficulty associated with cisternal puncture.

Grulee maintains that if one wishes to draw conclusions from the material obtained by lumbar puncture, there are three things that are necessary; first, that no puncture, successful or otherwise, shall have preceded the one by which the material is obtained; second, that the red cells, if present, shall have undergone degeneration; and third, that definite xanthochromia shall be present. The third is not so important because

often one will get a perfectly clear but xanthochromic spinal fluid.

Fresh blood in the spinal fluid is often the result of trauma.

Causes of Convulsions.

In considering the causes of convulsive seizures in the new-born, one may divide conditions which are to be considered into two main groups: first, those in which there is no evidence of intracranial hemorrhage, and second, those in which such a lesion is known to exist.

In the first group must be included all febrile diseases, such as pneumonia, pyelitis, sepsis of the new-born, and meningitis, erythroblastosis of the new-born.

In some instances it may be due to cerebral congestion. In others to some deficiency in the metabolism, such as tetany of the new-born, as indicated by convulsions, a Chvostek sign. Trousseau's sign may or may not be present. The diagnosis is confirmed by finding a lowered blood calcium.

Marriott and Hartmann have proved that a condition of hypoglycemia is met with in the new-born as cause of convulsions. Children with this condition are usually the offspring of diabetic mothers, and under such circumstances there is a definite indication for the determination of the blood sugar.

Changes in the blood supply to the brain may be responsible for the occasional association of convulsive seizures with congenital cardiac lesions.

Another condition which is far more frequent is that designated as congestion, oedema of the brain, also sterile meningitis. The differential diagnosis is difficult. There is an increase in the amount of spinal fluid, with leucocytes and a positive globulin. These infants usually make a complete recovery by the 15th day, with no residual effect.

Until recent years little consideration has been given to the various defects of the brain of a congenital nature as a cause of convulsive seizures. The opinion is widespread that Little's disease or spastic diplegia is the result of birth hemorrhage. In 1924 Collier⁴ stated conclusively that after a thorough review of Little's report on diplegia that he could find no evidence that Little in any case attributed the condition to intracranial hemorrhage of the new-born. Collier concluded this part of his address with the statement: "The evidence demands the verdict that meningeal hemorrhage should be deleted as a causal factor of any infantile spastic state."

Ford,⁵ who made a careful study of cerebral palsies, found that only 6 per cent. of those studied were due to injury at birth. He stated: "Common, diffuse, meningeal hemorrhage which is not large enough to cause death, apparently leaves no residuum in an overwhelming majority of cases. The real birth injuries to the brain are caused by the irregular intracranial hemor-

hages and necroses, by depressed fractures with laceration of the brain and undoubtedly by more or less encapsulated meningeal hematomas which compress and soften the cortex." He stated too that the dipelgia is the "result of a physiological process of intra-uterine origin and is not due to meningeal hemorrhage at birth." Here again the obstetrician has been unduly blamed for a resultant condition which is now proved to be congenital in origin.

Treatment.

Where there is evidence of increased pressure as indicated by a bulging fontanelle, or increased spinal fluid pressure and a successful spinal tap, indicates gross blood, daily or more frequent lumbar punctures may be indicated for the relief of pressure. The value of repeated lumbar punctures is debatable. At the same time it is advisable to give 10 c.c.s. of whole blood from the mother or father subcutaneously for the rare case that is due to the hemorrhagic diathesis.

Methods of Resuscitation.

As I have pointed out the majority of cases of intracranial hemorrhage are born in a condition of asphyxia, and may I here put in a word to the obstetrician, viz., that if the infant fails to breathe on reaching the outside world that he at once suspect intracranial hemorrhage, and avoid those brutal and the antiquated vigorous methods of resuscitation, advocated in text books, for these have in many cases been the cause of an extension of an already existing small, localized hemorrhage. Practically the only treatment that should be practised in the resuscitation of the new-born is to remove any mucus from the throat by means of a mucus catheter, and to encourage attempts at respiration by gentle traction on the tongue with tongue forceps at the rate of about twenty pulls per minute, together with the injection of a cardio-respiratory stimulant such as "Coramine."

Should the infant attempt to breathe, inhalation of 5% carbon dioxide in oxygen is of definite value in stimulating the respiratory centres.

With the establishment of respirations, the infant should be placed in a crib, with external heat. The head of the crib should be raised twelve inches to favor drainage of the extravasated blood into the spinal canal. Steps should be taken to insure absolute quietness for the infant. The infant should not nurse, but should be fed expressed breast milk, by means of a medicine dropper or in the more severe cases by nasal catheter.

In the irritable, crying infant, with or without associated convulsions, 15 minims of Tr. Camphor Co. or a half grain chloral, may be ordered every four or six hours as a sedative.

Besides lumbar punctures for the reduction of intracranial pressure, Moncrieff⁶ of London, recommends and now uses, prophylactically in cases of difficult labor, hypertonic ten per cent.

saline, injecting into the rectum as a retention enema, two to three ounces of the solution, at four hour or longer intervals, according to the improvement observed.

Owing to the difficulty in locating the site of the hemorrhage, and the very high mortality rate, operative measures are rarely advisable.

Conclusions.

In conclusion, regarding the treatment, the situation is not so dark, because, happily, preventive measures are of great advantage. The increase in the number of "prenatal clinics," along with the tendency for expectant mothers to consult obstetricians many months before delivery, will certainly result in much better attention at the time of delivery and the prevention of many accidents of birth such as have occurred heretofore. A better knowledge of the physiology of the pregnant mother and her unborn child will result in more strength for the latter and better physical condition for the former. It is to be expected that such professional activities will result in a marked reduction of prematurity, with a consequent reduction in the number of instances of intracranial hemorrhage.

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*The Surgical Training of the Country Practitioner

By

T. I. BROWNLEE, M.A., M.D., C.M. (Man.)

One may best arrive at an understanding of the surgical problems confronting the general practitioner in rural areas by referring briefly to a few typical cases:

1. A young man was kicked in the abdomen by a horse about 8 o'clock one night. He lived 28 miles from a doctor so home remedies were applied all night without avail. Next day the doctor was called and found the young man's abdomen extremely tender and rigid as a board but without any mark of violence on it. It was easy to diagnose an intra-abdominal catastrophe, but already 14 precious hours had passed following the injury.

* Paper read at Annual Meeting of Manitoba Medical Association, Winnipeg, May, 1937.

2. Acute appendicitis at any stage from 3 hours duration to 6 days and at any age from 3 years to 70. Country practitioners once sent all cases of acute appendicitis to the city for treatment. The mortality rate of this line of treatment is now marked by the gaps in so many family circles in our country districts.

3. A mother brought her 5-year-old daughter in 15 miles to see the doctor. Under her other arm she carried the child's right leg wrapped in a newspaper. The child had been riding on the back of the buggy and her foot slipped through the spokes of the buggy wheel which completely wrenched off her right leg about the knee joint.

4. A feeble old man of 73 was brought in 3 weeks after he had severely frozen part of both feet. He had a bad heart, high blood pressure, and bronchitis, as well as some prostatic trouble. All the toes of the right foot were black and rather dry and shrivelled toward the ends and pus was oozing out around the line of separation. The stench of decaying human flesh was terrible.

5. A young man was helping move a portable granary one day when his right foot slipped under the building. Before the horses could be stopped he had a compound fracture-dislocation at the ankle. The lower ends of tibia and fibula were generously covered with dirt. His foot and leg were wrapped in rags and he was brought in 20 miles to the doctor.

6. A man of 35 years was seized with a sudden severe pain in his abdomen about 10 o'clock one night. He was taken to the doctor about 4 o'clock in the morning. It was a classical picture of perforated peptic ulcer.

7. A frail little woman of 51 years who had suffered from a femoral heima for 20 years got a strangulation and tried home treatment all night. Finally after 16 hours she was brought in a distance of 18 miles. She was vomiting frequently small amounts of dark brown very evil smelling material. It was winter time and no train before the next night and no prospect of a specialist's care for at least 24 hours.

8. Fractures of a large variety of bones. Simple, compound comminuted, some seen within an hour and some not for a week, dislocations of fingers, elbows, shoulders, jaws, hips, knees, etc.

9. Scores of cases of children with diseased tonsils and adenoids and very little money and less inclination to travel to a specialist.

10. Acute urinary retention, ischio rectal abscess, fistula-in-ano haemorrhoids, varicose veins, urinary extravasation, and torsion of the spermatic cord.

11. A man was sharpening a fence post with a sharp axe. The axe slipped and severed the extensor tendons of his left thumb completely.

12. A boy of 11 years was playing around a well-drilling outfit and picked up a detonator cap. He went into the farm house with his treasure. Using his mother's hat pin, he explored

the depths of this cap while holding it between his left index finger and thumb. A deafening explosion ensued and in a dazed way the boy saw two of his fingers hanging in the window curtains some feet away. He looked at his hand and saw a wreck. Middle and ring fingers were gone completely and the hand split open. A stub of thumb remained and sketchy parts of the index and little fingers. His face was oozing blood from many small cuts.

13. A mother brought her 9 months old baby boy in one morning saying that he had been vomiting and crying with abdominal pain in spells for the past 10 hours. The child relaxed completely and looked pale and limp between spells. Examination of the diaper disclosed a small amount of "the red currant jelly" type of stool and palpation of the abdomen during a quiet spell disclosed the mass that told of acute intussusception.

This list of type cases is by no means complete and they are not placed in order of importance. They are common to most general practitioners in the country. I have seen and treated all these and many more. They serve to illustrate the sort of surgical work which is out of the specialist's reach and which the general practitioner in the country is almost obliged to do if he really pretends to engage in general practice.

Surgical Training of Medical Student.

Having reviewed the surgical problems that face the general practitioner, let us look at the preparation given him by our own medical school which is said to be one of the foremost in Canada. The student is given a fairly comprehensive course in Anatomy, Surgical Anatomy, Histology, Pathology, Surgical Diagnosis, and at least a bird's eye view of the whole wide field of theoretical surgery. At his examination in operative surgery he is likely asked to describe in detail such operations as an Albee or an amputation through the hip, or a Billroth II or a Kraske, or a Wertheim, or a thorocoplasty, or even a perineal prostatectomy. Any of these might make interesting reading for a general practitioner on a wet afternoon but none of them will ever make him a better general practitioner. If the student must have such mental exercise it would be infinitely better to drill him in therapeutics, obstetrics, dermatology, or some of the other branches of general practice which he can use when he is alone out in the country. The student has no idea during his undergraduate years what general practice has in store for him and so he places equal emphasis on each surgical subject. How could it be otherwise? The G.U. specialist emphasizes his field, the goitre specialist his, the orthopaedist his, and the ear, nose and throat specialist his. The student is bewildered and tries to satisfy them all and hopes and prays he can scrape at least a pass on the examination.

The final year in medicine is now a hospital year and the internes spend part of it on surgical services where they take histories, pass catheters,

make diagnosis, and assist more or less at operations. In this way they are supposed to be prepared to go out into general practice and take charge of such surgical cases as I outlined in the first part of this paper. I am afraid that very often the interne is a sort of human retractor who exposes the field of operation more or less completely so that the specialist can get the operation over. He may apply an occasional haemostat or cut a ligature—with permission. Do you let him make an incision? Do you teach him to tie a knot? Do you let him for instance remove an appendix step by step, while you stand by scubbed up to guide and direct him? Do you have him remove tonsils and adenoids under your guidance? Do you have him set an occasional fracture and apply proper splints while you look on? Do you have him use local anaesthesia under your eye a number of times so he will understand what he is doing?

Surgical Responsibilities of General Practitioner.

Remember in a few months this young man or young woman is going out maybe to some remote country point to do all these things himself, without your help or the comfort of your advice. I have seen some among your recent graduates doing surgical work.

Did you train the embryo general practitioner carefully in the essentials of diagnosis and treatment of the every-day hum drum surgery, such as described in the earlier part of this paper remembering that surgical knowledge such as this is what he will need when he goes out into general practice? Let me emphasize that diagnosis is but one step toward curing the patient. It doesn't help much for you to tell a patient who has had a severe abdominal injury that he has probably a perforated bowel or a ruptured liver. You must *do* something. The general practitioner in the country cannot call on a specialist to shoulder his surgical responsibilities at a moment's notice. He must see his patient, make his diagnosis and very often carry out the treatment on his own responsibility or with the help of another general practitioner no better fitted to do so than he.

Perusal of the last medical calendar shows that about 100 persons have graduated in medicine in Manitoba in 1935 and 1936. So far as the general public can tell, each one of these graduates is fitted to do the surgical work already referred to earlier in this paper. During the same two years one man took his master's degree in surgery and it is pretty safe to say that he is a recruit to the ranks of the specialists. There is no point in denying that the type of surgical work referred to is in the field of the general practitioner and will continue to be there in the future. I want to suggest as gently as I may that very many of the 100 graduates of 1935 and 1936 are not properly trained to meet the surgical problems of general practice. Eventually they will train themselves as their predecessors have done, but that training might cost human lives.

Solution of Problem.

The solution to the problem of properly training men and women to practice the surgery of general practice is to recognize early in the medical course that in the main you are not going to produce a race of specialists but rather the future general practitioners, who in the nature of things, must handle certain types of surgery only. With this in view, the logical thing to do is to set out a suitable surgical program and then require a high pass standard in this limited course.

When a student had passed this examination, everyone would be satisfied that he was properly fitted to do the limited surgery in general practice. In recognition of this qualification, he should have conferred on him a degree in surgery which would indicate to the profession and the public alike that the bearer is qualified to undertake surgery in his own field. This degree (call it Bachelor of Surgery or what you will) should in its way be just as good a guarantee of proficiency in the surgery of general practice as is the Fellowship of the Royal College of Surgeons among specialists.

For those students who intend to specialize in surgery, there is still remaining the Master's Degree in Surgery which requires a longer hospital experience and a wider knowledge of surgery than the average general practitioner holds. To take care of those students who aim to become research men, pathologists or internists, should require no great ingenuity. Instead of the surgery of general practice in their final year they could take up special work in the departments they had chosen.

Conclusions.

In conclusion let me remind you that the measure of the general standard of surgery in Manitoba is not to be taken as that of a small group of specialists who are working in well-equipped hospitals and under the best possible conditions. You must always remember the large and ever growing volume of every-day surgery being done by general practitioners throughout the length and breadth of the land.

As the standard of this surgery rises, so will the general standard of surgery in Manitoba rise, and not otherwise. I would plead with those in charge of the Department of Surgery to see to it that the young men and young women going out into general practice are as well qualified as it is humanly possible to make them in the science and art of the limited surgery required in general practice. You owe this alike to the profession and to the public.

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Minutes of Special Meeting

Minutes of a special meeting of the Winnipeg members of the Manitoba Medical Association Executive held in the Medical Arts Club on Monday, October 25th, 1937, at 12.30 noon.

Present.

Dr. C. W. Burns,	Dr. O. C. Trainor
(Chairman)	Dr. W. G. Campbell
Dr. Digby Wheeler	Dr. E. W. Stewart
Dr. C. W. MacCharles	Dr. S. G. Herbert.
Dr. E. S. Moorhead	

Guests: Dr. F. G. McGuinness, Dr. F. D. McKenty.

Report of Committee Appointed to Deal with Letter from Dr. Strong.

A meeting of this Committee was held on September 29th, 1937.

Present.

Dr. C. W. Burns,	Dr. C. M. Strong
(Chairman)	Dr. Digby Wheeler.
Dr. S. G. Herbert	

Dr. Strong's letter dealt with the treatment of accident cases under the Workmen's Compensation Board, and raised the question as to the workmen having free choice of doctor and the relation of Company doctors to the treatment of compensation cases. The Committee made four suggestions,

first of which was deleted by the Executive, and the other three accepted.

The Secretary was instructed to write to the Commissioner of the Workmen's Compensation Board, and arrange a meeting between the Commissioner and the Workmen's Compensation Referee Board in order to discuss the suggestions.

Instructions for Representative on the Executive of the Canadian Medical Association.

Dr. Moorhead stated that as representative of the Manitoba Medical Association on the Executive of the Canadian Medical Association, he desired instructions in connection with the agenda for the meeting of the Executive of the Canadian Medical Association on October 28th and 29th, 1937.

One of the chief items on the agenda was the proposed constitution for the Canadian Medical Association. A copy had evidently been sent to Dr. Moorhead in his capacity as a member of the Executive of the Canadian Medical Association. It was pointed out that the Manitoba Medical Association had never received a copy of this proposed constitution, and had no official intimation that revision of the constitution was contemplated. The members of the Executive present therefore were not familiar with the matters referred to in the draft of the constitution.

Various sections of the proposed constitution were discussed.

It was moved by Dr. W. G. Campbell, seconded by Dr. E. W. Stewart: That Dr. Moorhead be instructed to report to the Executive of the Canadian Medical Association that as no copy of the proposed constitution for the Canadian Medical Association has been sent to the Executive of the Manitoba Medical Association for consideration, the Executive of the Manitoba Medical Association was unable to offer any studied comments.

—Carried.

Changes in Health Act for Ontario.

Dr. Moorhead explained that the new health act for Ontario evidently made it impossible for medical men to collect fees from patients for whom the municipality pays the hospital fee. If this were copied in Manitoba it would affect relief cases and semi-public cases.

It was moved by Dr. E. W. Stewart, seconded by Dr. O. C. Trainor: That Dr. Moorhead be instructed to bring up this question of the Health Act for Ontario at the meeting of the Executive of the Canadian Medical Association and get an exact definition of the meaning of the section under discussion, and report back to the next meeting of the Executive of the Manitoba Medical Association.

—Carried.

The meeting then adjourned.

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Department of Health and Public Welfare

NEWS ITEMS

The following is an excerpt taken from an Article entitled "Brighter Outlook for the Control of Pneumonia" by Claude D. Head, Jr., published in a recent issue of "The Health Officer," which your Department believes to be of timely interest:—

"If Osler were alive today he would not write as he did in 1912: 'Pneumonia is a self-limited disease which can neither be aborted nor cut short by any known means at our command.' The introduction of the use of serum in the treatment of pneumococcal pneumonia by Cole and his co-workers in 1912, the identification of the higher types of pneumococci by Georgia Cooper in 1928-32, the introduction by Neufeld's rapid method of typing by Goodner in 1932, and the introduction of rabbit antipneumococci serum by Goodner and Horsfall in 1936-37, have placed in the hands of health officers throughout the country the means of bringing about a definite reduction in the mortality rate from this 'Captain of the Men of Death.'"

Pneumonia as a cause of death in the United States is exceeded only by heart disease and cancer.

Pneumonia is a group of diseases caused by a number of morphologically and serologically distinct organisms. The pneumococcus is responsible for probably over 90 per cent. of all cases. Friedlander's bacillus, Hemophilis influenzae, and various streptococci and staphylococci are responsible for the remainder.

The pneumococcus is a Gram-positive encapsulated diplococcus, occurring singly or in short chains. The chain formation is more frequently noticed in young (12-18 hr.) broth cultures. The pneumococcus is bile soluble, differing in this respect from the streptococcus. It grows readily on blood-agar or in blood broth.

As early as 1900, it was recognized that there were three distinct types of pneumococci: I, II, III, and a group IV into which was placed a number of separate types which did not fall into the first three. Prior to 1929, it was generally recognized that the incidence and mortality of the various types were approximately as follows:

	Incidence	Case Fatality
Type I	34%	22%
Type II	31%	25%
Type III	16%	45%
Group IV	19%	8%

SERUM THERAPY

It was shown, as early as 1891, that animals could be immunized against pneumococcal infections by repeated injections of killed cultures, and that serum from such immunized animals, conferred protection upon experimentally infected animals. With this background and on this basis, Cole and his co-workers in 1912 at the Rockefeller Institute Hospital, New York City, began the use of Type I serum in human patients. This was probably the first and most important step ever taken toward pneumonia control.

Results were so encouraging that the use of Type I serum in appropriate cases has been continued up to the present time. Out of Cole's long experience with this method of treatment, and supported, amplified, and repeatedly confirmed by numerous workers throughout the country and in many parts of the world, has come the comforting knowledge that Type I pneumonia, at least, can be cut short and the mortality rate considerably reduced.

The use of Type II antiserum did not produce the same degree of success, and after a rather extensive

trial, was discontinued. Type III antiserum was also produced, but had such slight agglutinating power and such slight protective power for animals that its therapeutic application was not considered justifiable.

During the last fifteen years many advances have been made in the concentration and purification of antipneumococcal serum. Following these improvements the use of Type II antiserum was revived and has been employed in a sufficient number of cases to show that its early use in specific cases is followed by a gratifying reduction in mortality. In spite of refinements in production and manufacture, however, there is no satisfactory serum therapy for pneumococcus Type III pneumonia at the present time.

ISOLATION OF HIGHER TYPES OF PNEUMOCOCCI

The second step of vital importance toward pneumonia control was taken by the late Georgia Cooper, of the New York City Department of Health in 1928-32 when she isolated from the heterogeneous group IV, twenty-nine serologically distinct types of pneumococci which she numbered IV to XXXII. This work explained a number of epidemiological questions which up to that time had remained unanswered. Recent work on the incidence of pneumococcus pneumonia has shown that Type I, II, III, V, VII, VIII, XIV, and XVIII account for about 85% of all cases.

Following Cooper's work, immune sera have been produced against many of the higher types of pneumococci. In areas where pneumonia control has been undertaken on a wide scale and on the open market, there are now available the following antisera: Types I, II, V, VII, VIII, XIV, and XVIII. Experience with the use of sera of the higher types is not as large as with the sera against Type I and II organisms, but published figures are distinctly encouraging and indicate that the patient should always be given the advantage of the serum.

TYPING THE INVADING PNEUMOCOCCI

From the beginning of serum therapy the impression, amply supported by recently published figures, was gained that the earlier serum was administered after onset of the disease, the better was the prognosis. It was also found, as was to be expected, that unless homologous serum was used it was of no value. With the methods of typing in vogue at that time, it not infrequently required 8-24 hours to determine the type of invading pneumococcus. This unavoidable delay in determining the type, particularly when the patient or his relatives had delayed seeking medical advice until three or four days after the onset of the disease, not infrequently meant the difference between recovery and a fatal outcome.

In 1902 Neufeld showed that a typical and characteristic reaction occurred when cultures or suspensions of pneumococci were mixed with homologous antiserum. This reaction is quite distinct and specific and occurs only when organisms are mixed with homologous antiserum. No reaction occurs when heterologous serum is used. This reaction is the basis for the rapid method of diagnosis in widespread use today. It consists of a marked swelling of the capsule of the pneumococcus in the presence of homologous antiserum. In collecting the specimen of sputum from the patient, it is important to see that the sputum is coughed up from the deeper air passages and is not just saliva. When the patient is unwilling to cough deliberately because of pain in the side of the chest, the application of heat and a tight chest binder will often afford enough relief so that the specimen may be collected without difficulty.

It should be collected in a wide-mouth bottle without preservatives or antiseptics of any kind and taken or sent immediately to the laboratory for typing. The technic of typing is as follows: A loopful of sputum is mixed with a loopful of diagnostic rabbit serum and a loopful of methylene blue and examined in a hanging drop slide under the oil immersion lens. A positive reaction is indicated by a marked swelling of the capsule as shown by the appearance of a bright halo around the pneumococcus. If no halo appears, the examination is repeated, using a different diagnostic serum.

If difficulty is encountered in the typing, a small amount (0.2 cc) of the sputum or body fluid under question is injected into the peritoneum of a white mouse. The animal is allowed to die or is sacrificed in 4-8 hours and an examination made of the peritoneal exudate in the manner described above.

Neufeld's discovery apparently went unnoticed in the medical world until 1932. The third step, then, of vital importance in the control of pneumonia, was taken in 1932 by Doctor Goodner of the Rockefeller Institute Hospital when he introduced and popularized Neufeld's reaction. By this means, the type of invading organism can be determined by a trained worker in a few minutes. This of course means that the appropriate serum can be employed promptly and without delay. Where delay so frequently means death, this in turn can be translated into the saving of many lives.

RABBIT ANTIPNEUMOCOCCIC SERUM

Prior to 1936, all serum used in the treatment of pneumonia was horse serum. It has long been known that immunization of horses for the production of antipneumococcic serum presents many difficulties. It requires from 6 to 12 months, or longer, to secure serum of reasonably high titer, and many horses even after repeated injections, produce no antibodies at all, or so few that their sera are of practically no therapeutic value.

During 1936 a fourth and very interesting step and one possessing great possibilities for pneumonia control was taken by Horsfall and Goodner at Rockefeller Institute Hospital. In experiments with animals other than the horse, they showed that rabbits could be immunized promptly (4 to 6 weeks) as compared with the horse (6 to 12 months), and that the vast majority of rabbits responded to the immunization by the production of a serum with a titer three or four times that of the horse.

Horsfall and Goodner have shown that rabbit serum is equal to horse serum in therapeutic value and in many respects is superior. With rabbit serum there is no "prozone effect," a reaction previously demonstrated by Goodner and Horsfall which is one of the characteristics of horse serum.

In investigating this "prozone effect" these workers found that for each lot of antipneumococcic horse serum there was a certain amount which gave maximum protection against large numbers of pneumococci. They found that when more than this certain amount of antiserum was used, more animals died, instead of surviving as might have been expected. As stated, this "prozone effect" is absent when rabbit antiserum is used.

Rabbit antibodies have been demonstrated in pleural exudates while horse antibodies have not been demonstrated in such exudates. Cases are on record in which pleural exudates loaded with pneumococci have been rendered sterile with subsequent absorption following the administration of homologous rabbit serum.

ADMINISTERING THE SERUM

In administering the serum, give 0.1 cc of serum intravenously, diluted 1:10 with sterile saline. Watch the blood pressure and pulse rate of the patient carefully for 30 minutes. If the blood pressure has not

fallen 20 mm of mercury and if the pulse rate has not increased 20 beats per minute, and if the patient has shown no other reaction, it is probably safe to administer the rest of the serum. An attempt is made to give the entire dose (at least 100 cc in Type I and 200 cc in the other types) at one "sitting" so that the maximum concentration of antibodies may be reached in the patient's body as rapidly as possible. The serum is injected slowly, of course, but the attempt is made to give the entire amount necessary in one dose rather than in divided doses, 8, 12, or 24 hours apart. If asperin (gr. XV.) is given at the time of intravenous injection of serum, many reactions can be prevented. This precaution is of benefit only when rabbit serum is used.

REACTIONS IN ANTIPNEUMOCOCCIC SERUM THERAPY

It is perhaps inevitable that some reactions will occur following the intravenous administration of relatively large quantities of foreign protein. These reactions may be divided into several types:

1. **Anaphylactic Reaction**—This fortunately is quite rare, but since it may be fatal should be kept constantly in mind when intravenous protein is given. It occurs in individuals who are sensitive to horse serum (to date no reactions of this type have been reported following the use of rabbit serum) and may come on immediately or within a few minutes after the introduction of the serum. It consists of a more or less severe asthmatic attack with dyspnea and flushing of the face, followed by cyanosis, sweating, general anxiety and apprehension. The attack if not too severe may be relieved by immediate administration of 0.5—1.0 cc adrenalin hypodermically.

2. **Thermal Reaction**—This occurs usually from 20 minutes to 1 hour following administration of the serum, and is characterized by a chill, or chilly sensations, slight difficulty in breathing, some cyanosis, moderate rise in temperature. The temperature soon falls and the patient may perspire profusely. Only symptomatic treatment is needed for this reaction.

3. **Serum Disease**—This occurs usually 7-14 days following administration of the serum and may consist of fever, urticarial or erythematous skin rashes, arthralgia, generalized adenopathy. These conditions may occur singly or in any combination, and may be mild or quite distressing. Fortunately these symptoms are transitory, leave no permanent ill effect, and require only symptomatic treatment.

WATCHWORDS OF CONTROL

Here then are the means which science has placed at the disposal of health officers, within our times, for the control of pneumonia: Certain knowledge of 32 types of pneumococci which produce the disease; a speedy way of determining the type of infecting organism; specific serum therapy for at least those types that result in a high percentage of the deaths; and new means of producing effective sera at a lowered cost that should make a specific treatment available to many more patients. There is a brighter outlook for the control of pneumonia. Its watchwords are: Early diagnosis, early typing and early serum treatment. For the majority of patients, this means early recovery."

SILICOSIS IN MANITOBA

During the past ten years, continued expansion of the mining industry in Manitoba has caused increased concern by all interested parties in the added health hazards which this industry presented. The first attempt to determine the extent of this hazard was made in 1930, when the Provincial Department of Health, in co-operation with the Manitoba Sanatorium, examined the underground men, and the working conditions in five mining areas in the province: The

report of this survey showed dust concentrations of sufficient silica content to cause silicosis in most of the underground operations, and x-ray plates of the workmen confirmed this finding by demonstrating actual silicosis in some of the men who had had a long mining history. From this study it became apparent that there was a danger of silicosis developing, and it was estimated that an exposure of seven to twenty years to the present concentration of dust would produce the disease.

Following this work, it became increasingly apparent that some form of compensation for men who became disabled through this exposure would have to be granted. In 1936 an amendment to "the Workmen's Compensation Act" was passed, which included silicosis among the list of compensatable diseases. A stipulation was made that no one who had less than five years continuous exposure in Manitoba to dust containing silica dust, or who had a disability of less than 20 per cent., would be considered eligible.

In order to procure uniform examinations of the exposed men and to the end that proper selection be made of new men applying for work in mines, eliminating those considered unfit, regulations were made in April, 1937, under "the Public Health Act," requiring all men in "prescribed occupations" to become holders of a subsisting license issued by the Minister. For a workman to procure such a license necessitates his submitting to a physical examination, which must include x-ray plates. A "prescribed occupation" includes all industries where silicosis may be contracted, e.g.: mining, iron and steel foundries, etc., and a further section stipulates that no employer may legally engage a man in such occupation, unless he is the holder of such a license. Thus the present set up requires yearly examination by the Department of Health of all men engaged in underground mining, as well as the examination of all applicants for new jobs.

This work was commenced in the summer of 1937, and the following findings are based on the reports of 776 men already examined by the Department. Of these men, 698, or 89 per cent., were found to have x-ray findings of the chest which could be considered to be within the limits of normal. Of the 78 men with abnormal findings, 66, or 87 per cent., were found to have increased fibrosis of greater or lesser degree, whilst 12 had tuberculosis in some form.

In the final disposition of the men, all but 18 were granted subsisting licenses, and of these, only 9 men were rejected on account of silicosis of sufficient extent to be considered a disability. Others were rejected because of tuberculosis without any evidence of silicosis. It is not the policy of the Compensation Board or the Department of Health to reject men from the mines who show increase fibrosis, unless they are definitely infectious to other workmen, or unless they have a disability greater than 20 per cent. Consequently, we still have employed many men whose lungs show fibrotic nodulation due to the inhalation of silica dust. These men, in the majority of cases, will be allowed to remain at work, and continue as self sustaining citizens as long as they can be of service to the industry.

Our investigations thus far have established several factors of importance:—

1. Silicosis may be contracted in Manitoba mines, but requires a minimum of 7 to 10 years continuous exposure. That it is not, in itself, of the major importance which may have been given it in the past, is borne out by the fact that so far, it has affected only 9 per cent. of the workers at all, and less than 2 per cent. to point of actual disability.
2. Silicosis is not necessarily disabling, and if it remains uncomplicated, the workman may continue an active life for many years after the

x-ray demonstration of his fibrotic lung condition.

3. Tuberculosis is a very important factor in dealing with silicosis, no less than 11 of the 18 rejected men showing some evidence of tuberculous activity.
4. Tuberculosis, once it is introduced into a silicotic lung, shows markedly increased activity, as compared to an otherwise normal lung. Hence the importance of frequent examination, particularly of all those men who might at present be classified as potential silicosis cases.
5. The experience gained in Manitoba thus far, and substantiated by other places doing similar work, is that certain types of chest abnormalities as revealed by x-ray, are very poor potential risks for continuous exposure to dusts containing silica, although they may be well suited for other types of employment. Therefore, the advisability of maintaining a rigid standard of physical fitness for new applicants is most important. In this connection, particular emphasis must be placed upon detection of tuberculosis in its most insipient stage.
6. There is reasonable ground to believe that by such careful selection of applicants at present, along with greatly improved methods of ventilation and other means of prevention now under investigation, we will be able to eventually reduce to a minimum the hazards of mining in Manitoba.

COMMUNICABLE DISEASES REPORTED

Urban and Rural - October, 1937.

Occurring in the Municipalities of:

Chickenpox: Total 211—Winnipeg 95, Brandon 62, Lawrence 17, Roblin Rural 12, St. James 10, Rivers Town 6, Flin Flon 4, Carberry 1, Morris Town 1, Strathclair 1, St. Laurent 1 (Late Reported: August, Flin Flon 1).

Whooping Cough: Total 170—Winnipeg 51, Unorganized 25, Lakeview 14, St. Boniface 12, Flin Flon 12, Stonewall 11, Rockwood 7, Brandon 5, Woodlands 4, Kildonan East 3, Minnedosa 3, La Broquerie 2, Rosser 2, St. Laurent 2, St. Vital 2, Brooklands 1, Morris Town 1, Morris Rural 1, Odanah 1, White-mouth 1 (Late Reported: July, Unorganized 1; August, Flin Flon 6, North Norfolk 1, Piney 1, Westbourne 1).

Scarlet Fever: Total 101—Winnipeg 67, Macdonald 5, Cartier 3, Portage Rural 3, Edward 2, Ethelbert 2, Flin Flon 2, Kildonan East 2, Selkirk 2, St. Vital 2, Arthur 1, Brandon 1, Minitonas 1, Rosser 1, Springfield 1, St. Boniface 1, St. James 1, Tache 1, Transcona 1, Unorganized 1, Woodlands 1.

Tuberculosis: Total 94—Winnipeg 16, Unorganized 10, Brandon 4, Portage City 3, Rhineland 3, St. Boniface 3, St. Clement 3, Tache 3, Assiniboia 2, Franklin 2, Hanover 2, Lac du Bonnet 2, Lorne 2, Morris Rural 2, Rosser Rural 2, Selkirk 2, St. Laurent 2, Clanwilliam 1, Cypress North 1, Dauphin Town 1, Ethelbert 1, Flin Flon 1, Fort Garry 1, Grandview Rural 1, Grey 1, Harrison 1, Kildonan East 1, Kildonan West 1, Kildonan North 1, Lansdowne 1, Minnedosa 1, Neepawa 1, Oakland 1, Pembina 1, Pipestone 1, Roland 1, Russell Rural 1, Saskatchewan 1, Shell River 1, Springfield 1, Stonewall 1, Strathcona 1, St. Andrews 1, St. Anne 1, St. James 1, St. Rose 1, Transcona 1, Westbourne 1.

Anterior Poliomyelitis: Total 37—Winnipeg 5, Portage City 4, Swan River Rural 3, Unorganized 3, Gilbert Plains Rural 2, Transcona 2, Dauphin Town 1, Ethelbert 1, Gimli Rural 1, Old Kildonan 1, Morris Rural 1, Ochre River 1, Rosedale 1, Stanley 1 (Late Reported: August, Swan River Rural 4, Swan River Town 2, Minitonas 1, Strathcona 1; September, Minitonas 1, Transcona 1).

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Measles: Total 18—Winnipeg Beach 4, St. Anne 3, St. Andrews 2, Winnipeg 2, Brandon 1, Flin Flon 1, Gilbert Plains Rural 1, Hartney 1, St. James 1, Unorganized 1 (Late Reported: August, Brokenhead 1).

Diphtheria: Total 14—St. Clement 6, Winnipeg 5, Fort Garry 1, Montcalm 1, Rosedale 1.

Mumps: Total 11—Winnipeg 10, Franklin 1.

Typhoid Fever: Total 6—Hanover 1, Tache 1, Unorganized 1, Westbourne 1, Winnipeg 1 (Late Reported: August, St. Clement 1).

Erysipelas: Total 2—Winnipeg 2.

Influenza: Total 2—(Late Reported: Whitehead 1, Woodworth 1).

German Measles: Total 2—Brandon 2.

Undulant Fever: Total 2—Carberry 1, Norfolk North 1.

Lethargic Encephalitis: Total 1—Emerson 1.

Puerperal Fever: Total 1—Woodlea 1.

Septic Sore Throat: Total 1—Unorganized 1.

Venereal Disease Report: Total 137—Gonorrhoea 91, Syphilis 46.

DEATHS FROM ALL CAUSES IN MANITOBA For the Month of September, 1937.

URBAN—Cancer 33, Pneumonia 8, Infantile Paralysis 4, Tuberculosis 5, Whooping Cough 2, Syphilis 2, Cerebro Spinal Meningitis 1, Typhoid Fever 1, all others under 1 year 3, all other causes 171, Stillbirths 14. Total 244.

RURAL—Cancer 22, Pneumonia 11, Tuberculosis 15, Whooping Cough 4, Influenza 2, Syphilis 2, Infantile Paralysis 1, Scarlet Fever 1, Bacillary Dysentery 1, all others under 1 year 4, all other causes 188, Stillbirths 12. Total 263.

INDIAN—Tuberculosis 10, Pneumonia 2, Whooping Cough 2, Influenza 1, all others under 1 year 0, all other causes 7, Stillbirths 1. Total 23.

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Medical Library University of Manitoba

Current Medical Literature

Post-Graduate Medical Journal—August, 1937.

"The Radiology of Duodenal Ulcer"—by G. Simon, M.B., D.M.R.E., Chief Assistant X-ray Department, St. Bartholomew's Hospital.

"A Plea for Cholecystectomy Combined with Choledochostomy in Cases of Chronic Cholecystitis Associated with Gall-Stones"—by Rodney Maingot, F.R.C.S., Senior Surgeon to the Royal Waterloo Hospital, and to the Southend General Hospital.

"The Treatment of Carbuncles"—by R. H. Franklin, F.R.C.S., First Assistant, Department of Surgery, British Post-Graduate Medical School.

"Familial Spontaneous Pneumothorax"—by F. E. Saxby Willis, M.C., M.D., M.R.C.P., Physician, Royal Chest Hospital, Hampstead General Hospital, Weir Hospital, and Metropolitan Ear, Nose, and Throat Hospital.

"The Clinical Journal"—August, 1937.

"The Climacteric"—by S. Levy Simpson, M.A., M.D., Camb., M.R.C.P., Lond., Physician, Willesden General Hospital, and Assistant Physician, Princess Louise Kensington Hospital for Children.

"Post-Operative Chest Conditions"—by James Maxwell, M.D., F.R.C.P., Physician, Royal Chest Hospital; Assistant Physician, St. Bartholomew's Hospital; Consulting Physician, Royal National Sanatorium, Bournemouth.

"The Painful Kidney"—by Kenneth M. Walker, F.R.C.S., Surgeon to the Genito-Urinary Department, Royal Northern Hospital; Surgeon to St. Paul's Hospital.

"The Retina in High Blood Pressure"—by G. W. Pickering, M.A., M.B., Camb., M.R.C.P., Lond., Assistant in the Department of Clinical Research, University College Hospital.

"Cardiac Emergencies"—by T. Jenner Hoskin, M.D., F.R.C.P., Physician and Cardiologist, Royal Free Hospital.

"Cervical Myalgia in Adolescents"—by Ronald E. Smith, M.B., M.R.C.P., Medical Officer of Rugby School.

"Physical Methods"—by Clement Nicory, M.R.C.S., L.R.C.P., Late Chief Assistant Physico and Electro-Therapeutic Departments, St. Thomas's Hospital; and Physician, Physical Treatment Centre, British Red Cross Society, Kensington Division.

"Without Comment"—by William Hunter, M.D., M.C.O.G., Hon. Assistant Obstetrician, Princess Mary Maternity Hospital, Newcastle-upon-Tyne.

Post-Graduate Medical Journal—July, 1937.

"The Use of Hormones in Obstetrics and Gynaecology"—by John Beattie, M.D., F.R.C.S., M.C.O.G. (Assistant Physician Accoucheur, St. Bartholomew's Hospital).

"The Differential Diagnosis in Splenomegaly"—by Leonard Howells, M.D., M.R.C.P., Lond., Honorary Assistant Physician Cardiff Royal Infirmary, Mrs. John Nixon Research Scholar and Senior Assistant in the Medical Unit, Welsh National School of Medicine, Cardiff.

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